

CLAIMS

I/we claim:

1. An apparatus for exchanging heat, the apparatus comprising:
at least one conduit having a spiral shape for conditioned fluid to
5 flow through, ;
at least one heat sink compartment;
a chip layout comprising at least one thermoelectric unit positioned
between the at least one conduit and the at least one heat sink
compartment such that one surface of the array is in contact with the
10 fluid conduit and the second surface is in contact with the heat sink
compartment.
2. The apparatus of claim 1 wherein the at least one heat sink
compartment is a conduit having an inlet and an outlet for allowing
15 a fluid to flow through.
3. The apparatus of claim 1 further comprising a motor and a first fan
connected to the motor for driving the fluid to be conditioned
through the spiral-shaped fluid conduit.
- 20 4. The apparatus of claim 3 further comprising a second fan for
driving fluid through the heat sink compartment, the motor is a
double-shaft motor having two opposite coaxial spinning shafts and
the first and second fans are connected each to one of the two
opposite shafts.
- 25 5. The apparatus of claim 4 wherein the motor is located at the heat
sink compartment.
6. The apparatus of claim 1 wherein the fluid to be conditioned is air.

7. The apparatus of claim 1 wherein the fluid driven through the heat sink is air.

5 8. The apparatus of claim 1 wherein the fluid driven through the heat sink is water.

9. The apparatus according to any of the preceding claims wherein the spiral shaped fluid conduit comprises a rounded thermally conductive base plate, the plate is in contact with one surface of the thermoelectric layout; and
10 walls perpendicular to the plate, the walls forming a spiral path.

10. The apparatus of claim 8 wherein the first fan is positioned at the center of the spiral path.

15 11. The apparatus of claim 9 wherein the spiral path is provided with a plurality of pin fins perpendicularly protruding from the plate.

12. The apparatus of claim 9 wherein the heat sink comprises a thermally conductive base plate and a plurality of thermally conductive pin fins perpendicular to the plate and wherein the dimensions of said plate are substantially the same as the dimensions of the rounded plate of the spiral fluid conduit.

20 13. The apparatus according to any of the preceding claims for use as a fluid conditioner for directing conditioned fluid to a specific location through a conduit connected to the outlet of the spiral shaped conduit.

14. A heat exchange apparatus for use as a compact air-conditioning unit, the apparatus comprising:

a spiral-shaped conditioned-air compartment having a first inlet and a first outlet;

5 a heat sink compartment having a second inlet and a second outlet;

a thermoelectric array comprising at least one thermoelectric chip, positioned between the conditioned-air compartment and the heat sink compartment, such that when electric current is passed
10 through the array a temperature gradient is formed between the conditioned- air compartment and the heat sink compartment;

a motor having two opposite coaxial spinning shafts; and

two fans mounted each on one of the two opposite shafts such that one fan is mounted in the conditioned air compartment for driving ambient air through the first inlet, and the second fan is
15 mounted in the heat sink compartment for driving ambient air through the second inlet.

15. The apparatus of claim 14 wherein the conditioned air compartment
20 comprises a first heat transfer unit fabricated from a thermal conductive material, the heat transfer unit comprises a base plate and perpendicular walls forming a spiral path and wherein the first inlet and the first outlet are located at the inner end and the outer end of the spiral path, respectively.

25 16. The apparatus of claim 14 wherein the motor is mounted inside the heat sink compartment such that heat generated during operation of the motor is transferred to the air flowing through the heat sink compartment.

17. A method for conditioning fluid by a heat exchange apparatus, the method comprising:

driving a first fluid to be heated or cooled through a first compartment of a heat exchange apparatus, the compartment comprises a spiral shape path;

driving a second, coolant or heating, fluid through a second compartment of the heat exchange apparatus;

activating a layout comprising at least one thermoelectric chip for forming a temperature gradient between two surfaces of the array, wherein one surface is in contact with the first compartment and the second surface is in contact with the second compartment.

18. The method of claim 17 wherein one motor serves for driving both the first fluid and the second fluid through the first and the second compartments, respectively.

19. The method of claim 18 wherein the motor is provided with two opposite coaxial spinning shafts and wherein a first and a second fans, are mounted each on one of the two shafts such that the first fan draws the first fluid through the first compartment and the second fan draws the second fluid through the second compartment.